

DOCUMENT RESUME

ED 270 457

TM 860 302

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TITLE Global Measures: Do We Need Them?
PUB DATE Aug 85
NOTE 24p.; Paper presented at the Annual Meeting of the American Psychological Association (Los Angeles, CA, August 23-27, 1985).
PUB TYPE Speeches/Conference Papers (150) -- Viewpoints (120) -- Reports - Evaluative/Feasibility (142)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Adults; *Attitude Measures; Correlation; Feedback; *Global Approach; *Job Satisfaction; Measurement; Measurement Techniques; Multiple Regression Analysis; *Predictive Measurement; Pretests Posttests; Scores; *Stress Variables; Test Construction; Test Use
IDENTIFIERS *Job Descriptive Index; *Job in General Scales

ABSTRACT

Data from the areas of job satisfaction and job stress are used to illustrate the following points: (1) that measurements can be arranged conceptually along a continuum from the specific to the global (or general); (2) that scales can be constructed which represent different levels of generality, within the same content area; (3) that such scales are not equivalent or interchangeable; and (4) that such scales are useful and meaningful. A scale, the Job in General Scale (JIG), was constructed and administered to a large sample (n=600) as part of a test battery at a nuclear power plant construction site. Primarily the administration was to obtain the best possible estimate of general satisfaction from the items of the Job Descriptive Index (JDI) and to compare it with the JIG Scale. In addition, data was obtained for a later comparison of the effectiveness of the kinds of scales in predicting a number of tests. A correlational analysis showed that each of seven predictor scales predicted every one of the tests, with only one correlation not significant at the one percent level. Results were also analyzed in relation to facet scales, the Unidimensional scale, the JIG Scale, the Work Scale, and differences in scales. (PN)

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Global Measures: Do We Need Them?

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Invited Address: Distinguished Scientific Contribution Award,
Division 14,
American Psychological Association
Los Angeles, August 25, 1985

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I should love to name all the people responsible for my being here today, and for the ideas and data I want to talk about, but it would take the full hour. To the Division, I am grateful for receiving the award. To the graduate and faculty members of perhaps the longest continuous permanent floating rap and research game in our field, many, many, thanks. And I owe my ideas to innumerable authors who have discussed these same issues. I have learned much from the many manuscripts sent to me for review. And much of our research depends on the data you have sent to the BG data pool.

Rather than bury you in new data today, I have decided to re-emphasize a few basic principles that I think might be helpful. I'll use data only to illustrate my points and only from the two areas of job satisfaction and job stress. My points are:

That measurements can be arranged conceptually along a continuum from the specific to the global or general,

That scales can be constructed which represent different levels of generality, within the same content area, but

That such scales are not equivalent or interchangeable, and

That such scales are useful and meaningful.

Further, I shall try to suggest some guidelines to help in choosing measures.

Equivalence of Measures

First, a word about what I mean by equivalence. Frequently, we simply assume that two or more measures such as a specific and a global measure are equivalent. We choose a particular one for our investigations because it is familiar, available, frequently used, or labeled appropriately, or because it

fits on the page. To ensure that two measures are really equivalent, they must meet certain statistical criteria. We presented a long list in Smith, Kendall, & Hulin (1969). I have chosen only particularly important ones to cover today:

- A. The two measures should be very highly intercorrelated.
- B. More stringently, they should show a similar pattern of correlations with a set of other variables, and
- C. (We believe) they should also respond in a similar way to treatments or to a change in the situation.

We should try to get as much of evidence on these points as possible before substituting one measure for another.

The Specific-Global Continuum

Today, I am concerned with whether measures are equivalent when they vary on a continuum from specific to global. Specific measures score each aspect of a content area separately. Global measures seek an overall, integrative, summary score.

I will take my examples today from job satisfaction and job stress. But I hope the principles will apply to many other areas. For example,

In ability testing, when is it best to test specific skills, and when is it better to test group factors, or general intelligence?

In job evaluations, do we want a point system or a general classification system?

In establishing criteria, do we want dimensions or an index of overall performance?

In ratings, such as in interviews, performance evaluations, quality

inspections, do we want specifics or summaries?

Facet Scales

Facet scales of job satisfaction lie toward the specific end of the continuum. The Minnesota Satisfaction Questionnaire (Weiss, Dawis, England, & Lofquist, 1967), for example, can be scored for 20 sub-scales. The Quality of Employment Survey (Quinn & Staines, 1979) covers six features of the job. The Job Descriptive Index (JDI), which I shall discuss today, covers five -- Work, Pay, Supervision, Promotions, and People (Smith, Kendall & Hulin, 1969, 1975). Adjectives or brief phrases are presented, and the person merely indicates by a "Yes," a "No," or a "?" whether it describes his or her job. Items refer to a single content area, but differ in specificity. For example, on the Work Scale, one quite specific item is "Respected," while others are more general, such as "Good." One could construct facet scales with even more specific items--for example, "Quiet," or "Adequate lighting," or "Rough toilet paper."

Such scales are scored by totalling responses to a number of items. Other facet measures are single-item rating scales.

Numerous researchers have shown facet scales to be useful in pin-pointing particular areas of satisfaction and dissatisfaction. They are probably here to stay.

Global Scales

At the other, general end of the continuum, there are overall or global measures of job satisfaction.

Why Needed?

Why aren't facet scales sufficient? We ourselves began to use global

scales because:

(a) Facet scales omit some areas that may be important to some people, like location, community prosperity, company future, viable alternative jobs.

(b) When psychologists try to predict other feelings or behavior, they usually combine the facets in the same linear manner for all people. Curvilinear relationships, or individual differences in how they are combined, are not considered. Global scales permit the respondent to do what comes naturally -- to combine the facets in the same way he or she ordinarily thinks of them.

(c) Facet scales may include items irrelevant for the person.

(d) Facet scales may not reflect general temperamental characteristics--did the person have a cloth mother or a wire mother?

(e) The frame of reference for answering facet scales is short-term rather than long-term, and

(f) Global satisfaction is included in most theoretical causal models. I, for one, want to investigate its location in the model, and especially to determine if there are individual differences in the sequence and weights used for the components of the model. I strongly suspect, moreover, that satisfaction with a facet is linearly related to overall satisfaction only up to a point, is essentially unrelated in the middle of the range, and becomes linearly related again above another point.

Whether global measures actually prove useful or add nothing but rating error is an empirical question. We can answer it only by research employing global scales. So we need them, at least for the present.

What type to use? There are two approaches to getting a summary

measure:

(a) We can ask a number of specific questions and combine the responses in some way. The initial pool of items really determines the weights given various aspects. Combining diverse items is designed to mask differences among the components, analogous to the mixed content of a general test of intelligence, and it often does mask high scores on one type with low scores on another type of item.

(b) We can ask global questions and let the person use his or her own weighting to arrive at an answer. Many researchers have used a single rating. Others have totalled the responses to a number of general questions. The classic example is the Brayfield-Rothe (1951) Job Satisfaction Index. Others include the General scales of the Minnesota Satisfaction Questionnaire (Weiss et al, 1967) or Quinn and Staines' (1979) Facet-free Scale.

Why a new scale? Since scales such as these are available, why build a new one? When Gail Ironson and I started to construct a Job in General Scale, we realized we needed an instrument with at least the following characteristics:

(a) Multiple items to furnish an estimate of reliability. (How else would we know how to interpret non-significant results, or to estimate the extent of an effect?)

(b) Ease of reading -- to compare across all job levels we needed very low verbal levels.

(c) Minimal overlap of content with measures of supposedly different variables. Our satisfaction measure should not describe job characteristics or ask about intention to leave, for example.

(d) Demonstrated convergent validity.

(e) Responses of a global, integrative, evaluative, nature.

(f) For our special purposes-- shared method variance with the JDI.

We want to use the same format. We don't want a difference in method to make for differences in correlations, for example when we compare results using general and specific measures.

Construction of the Job in General Scales (JIG)

We, with many collaborators, have now finished construction of a Job in General scale, called JIG (Ironson, Smith, Gibson, Brannick, Miank, & Paul, 1985). We followed the usual steps in test construction. Further, we applied latent trait theory, and computed item response characteristics for a large pool of items on several very large samples. After several iterations, we now have a scale composed of 18 global evaluative items. Among equally discriminating items, we chose those with sufficiently diversified content as to avoid redundancy, and we spread them as evenly as possible across the range of favorableness. Typical items ask, "All in all, ... is your job: Good, useless, rotten, etc." For such items, the obtained coefficient alpha reliability of .93 is quite high.

On one sample we checked the convergent validity of JIG with 4 other scales: the Brayfield-Rothe (1951), the Faces scale (Kunin, 1955), a rating scale anchored by adjectives we had pre-scaled for favorableness, and a numerical rating scale. The correlation was highest with the Brayfield-Rothe (.80); the correlation was lowest for the numerical scale (.67), with the others intermediate. Such levels are at least minimally acceptable (but certainly don't indicate equivalence).

Test of Equivalence of Specific and Global Scales

Having developed the Job in General scale, we wanted to check whether it was merely equivalent to JDI. We wanted to see how highly they correlated with each other. Then we wanted to compare JDI and JIG for their effectiveness in predicting other tests. We wanted a large number of respondents and a large number of tests to be predicted. We planned a later prediction of a number of behaviors, both specific and general.

The Situation

Our opportunity came in a consulting job for a large nuclear power plant under construction. The plant was in trouble--five years behind schedule at a loss of over \$900,000 per day. (A commentator in The Wall Street Journal later nominated it as one of the ten worst-managed nuclear plants in the country.) Morale was bad.

On the basis of preliminary interviews we assembled and administered a pre-test battery. It included JDI, JIG, and a number of other scales measuring job characteristics and evaluations. The results of this survey led us to recommend an intervention. Management adopted our recommendation.

Supervisors were trained to observe incidents of behavior, to describe them in writing, and to discuss them -- within 48 hours -- with the subordinate involved. These incidents formed the basis for real BARS scales. When we reached intermediate levels in the organization, another intervention had to be introduced. I should have anticipated the problem, since I had met it before in a company that has since become notorious for chemical spills. In that company, there was absolutely no record of who was supposed to be supervising whom. To our dismay, we found a similar situation when we reached

the intermediate levels in our nuclear power plant. When we asked the titular supervisors to observe and discuss the behaviors of their subordinates, they said "You've got to be kidding, lady. I never see them; I just sign their papers." In some cases, one "boss" was signing for 60 subordinates, scattered widely over the construction site. Consequently, lines of authority had to be redefined and clarified before the behavioral incidents could be introduced through the rest of the organization.

We had to administer the first post-test before either intervention was completed--about 2/3 through-- because of an impending change in management.

The sample was large (over 600), and we had added even more tests to the battery. We had the data on hand, therefore, for a later comparison of the effectiveness of the kinds of scales in predicting a number of tests.

But first, we wanted to obtain the best possible estimate of general satisfaction from the items of the JDI. We wanted to compare it with the facets and the JIG scale.

Estimation of Unidimensional Variable

To estimate general satisfaction from the JDI, we could simply have added the scores on the 72 items which constitute the JDI. We, as authors of the JDI, have persistently discouraged this procedure because the scales were constructed to be discriminably different, and they are. The intercorrelations range typically from .25 to .50, and repeated factor analyses show more variance in the relevant factor than in the general factor for each scale, scarcely justifying adding scales. Our team decided to follow instead the suggestion of Parsons & Hulin (1982) and to use latent trait

analysis to get our overall estimate from JDI. What I will call "Unidimensional" here is theta. Its computation assumes a single underlying continuum. The program is complex and time-consuming to learn. The result seems to be roughly comparable to the first principal component unrotated or to a second-order general factor. We computed it as a presumably better general measure than the summed JDI.

Predictors

We will use, then three types of scales as predictors. They are intended to vary in generality: Facets = the set of five scales of JDI. They are relatively specific, and also short-term. Unidimensional = the estimate of the evaluative component of JDI, intended as more general, but still short-term and based on specific content. A second estimate of this type would have been the simple sum of the JDI. Job in General = the sum of 18 global items, in the same format as JDI.

First, how do the scales correlate with each other? Table 1 shows the

Insert Table 1 about here

intercorrelations of the JDI facets, the Unidimensional scale, and JIG. At this point we became curious about the relationship of the simple unweighted sum of the 72 JDI items to the sophisticated and complicated Unidimensional scale. So we inserted the total JDI into this matrix. It correlated .957 with Unidimensional!! The three general scales form a close cluster. But --

the Work Scale is part of the same cluster. Although the other scales are in the same general area, they are more distant. We decided for now to retain only the presumably better Unidimensional scale to represent the general component of the JDI, and to wait for further evidence to decide which of the others are equivalent.

Next, are the patterns of correlations of the global and the specific measures similar with other tests? Each type of satisfaction measure will be treated as a predictor, and each other test as a criterion to be predicted.

There were 29 other tests on the post-test. We item-analyzed each, and rescored most. All were scored with high scores favorable. We then treated each one as a criterion, and predicted it by multiple regression using all five JDI scales + Unidimensional Scale + JIG. (All 29 R's were statistically significant.) We then weeded out those tests with multiple R's below the arbitrary value of .25. These R's then ranged from .29 to .70. The 18 remaining tests were presumably relevant. The particular tests used are unimportant for today's purposes, but I'll run through them quickly.

Insert Table 2 about here

The tests which were predicted with R's above .25 were:

Intent to Leave--3 items (adapted from Mobley, Horner, & Holingsworth, 1978);

The Survey of Life Satisfaction--18 items, JDI-type (Ironson & Smith,

1978);

Trust in Management; and Trust in Fellow Employees--two 6-item scales
(Cook & Wall, 1980);

Identification with the Work Organization Index; and Acceptance of Job
Changes Index--reduced to two and three items each
(from Patchen, Pelz, & Allen, 1965);

Skill Variety; Autonomy; Task Identity, and Feedback--4-6 items each
(from the Job Characteristics Inventory, (Sims, Szilagyi,
& Keller, 1976);

Goal Clarity; Subordinate Freedom; Goal-setting Feedback; and Goal-
setting Participation--3-4 items each (from the Goal Setting
Attributes scales of Arvey & Dewhirst, 1976); and

Job Definition; Recognition; Need for Merit Pay System; and Communication
--3-4 items each, constructed for this job.

Coefficients alpha varied widely. All tests are predictable with multiple
 $R > .25$.

Results of Correlational Analysis.

First, are the predictors and the tests to be predicted indeed in the
same content area? Yes, they certainly were. There were no significant
negative relationships among the 18 tests. Moreover, each of the seven
predictor scales predicted every one of the tests with only one of the 126
correlations not significant at the one percent level.

Second, with all these intercorrelations, aren't the predictor scales
essentially equivalent? Do the different types of scales actually furnish
additional information? Facet scales have frequently shown their value in

indicating strong and weak areas of satisfaction, so today I shall put the burden of proof of usefulness on the more general scales. I shall compare the Unidimensional and the Job in General scales with the most predictive of the facet scales. Several questions need to be answered.

(a) Do the Facet scales really predict better than the other two types?

As the simplest test, are the bivariate correlations really higher with many of the tests? The answer is "Yes." In Table 2, under "r," there is an X wherever at least one of the facets shows a higher correlation with a test than the Unidimensional or JIG scales. Bear in mind that all the correlations are significantly greater than zero. An X represents a correlation that was higher than for the other scales. There are X's in 8/18 rows, with 7 of these significant.

(For this whole table, any sort of entry means a "hit"--a differential hit--for that type of scale. I count 7 or 8 hits here.)

Moreover, more stringently, does one of them add incrementally -- after the 4 other facets plus the Unidimensional plus the JIG scales? For example, did adding the the JIG Supervision scale increase the multiple correlation with a particular test over and above that obtained from the other six predictors--Work, Pay, Promotions, People, Unidimensional, and JIG?

The answer is again "Yes." In the second column, asterisks indicate in the usual way the significance of the increment. For 16/18 tests we can count a "hit" for a Facet scale, and each of the Facet scales, incidentally, hit some tests.

The facet scales perform well, as we expected, in predicting scores on other tests. Each contains information different from that in either type of

general scale, and from that in the other facet scales.

(b) Does the Unidimensional scale predict better than the others, using the same criteria? The third column shows only one bivariate r greater for this type of scale than for the best facet alone or for Job in General--and that difference was not significant. The next column shows that for only two tests did the computation of the underlying unidimensional value gain us any additional predictive power.

I, myself, shan't use it again for a global estimate, especially considering the time, costs, and potential difficulty in explaining it to laypersons. But for other purposes such as equating items and scales as suggested by Ironson, Guion, & Ostrander (1982) or for translations (Hulin, Drasgow, & Komecar, 1982) it sounds appealing. We used it in constructing JIG. We have also used it to revise the JDI scales. For that purpose, we expanded the pool of items for each scale, and assumed a different underlying continuum for each. The resulting revision, though slight, should increase spread of items, differentiation and reliabilities.

(c) How about Job in General? Does it help prediction? The last two columns show that this scale is indeed useful. Its bivariate correlation is largest in 9/18 cases, in five of them significantly so; its incremental multiple R is significant in 13/18. JIG predicts even after the best linear combination of JDI, computed in two different ways--multiple regression and latent trait analysis--has been used. The pattern of hits is quite different from that for the Facet scales. Sometimes one contributes heavily, sometimes the other, and sometimes both. Each has its role.

I want to emphasize that the proportion of "hits" for the different

types of scales would be very different for different situations and for different tests to be predicted.

(d) Some of you may have wondered about the Work scale, which correlated, .78 with JIG. Would it have done as well as JIG? No--it gave fewer "hits" on both counts [6/18 vs 9/18 for bivariate r , 4/18 vs 13/18 for incremental R ,] and sometimes it hit different tests.

(e) Are the differences simply due to artifacts? We checked for, and systematically ruled out, explanations in terms of reliability, distributions, self-report biases, format, social desirability, and the demographics of age, sex, tenure, education, and department.

(f) Do the differences really matter? Are the differences among scales large enough to be of practical significance? For my book, they are. Among the seven scales, prediction varies greatly. The range of significant bivariate correlations on one test was .10 to .52. Even the best facet differed from JIG by as much as .17 or over 5 times the standard error of the difference. And the incremental multiple R 's are sufficiently different to lead to different conclusions in many sophisticated analyses.

(g) Do the differences make sense? Can we see a meaningful pattern concerning what types of measures predict which tests? For the facets, the reasons are very obviously differences in specific subject matter. People Satisfaction predicts, not astonishingly, Trust in Fellow Employees; Pay Satisfaction predicts Need for Merit Pay; and Supervision Satisfaction predicts a number of variables concerning feedback, goal setting, communication, recognition, etc.

Job in General, at the other end of the continuum, clusters with other

general measures--Intent to Leave, Life Satisfaction, and Involvement with the Work Organization. But Work Satisfaction is also in the same cluster, and the Job Characteristics of Inventory Variables of Variety, Autonomy, and Task Identity are closely related. So, on the basis of the correlational data alone, the dimension could also be called extrinsic-intrinsic, or evaluative-descriptive, or short- vs. long-term, or low vs. high job level. However you name it, measures varying along the continuum are not equivalent.

Response to Treatments

Fortunately, we have further evidence concerning equivalence and meaningfulness. The facet measures responded differently to the interventions. Remember that we were trying to improve Supervision. For about 2/3 of the employees we had introduced discussions of job behavior, and lines of responsibility had been specified or clarified.

First, we could compare mean scores on JDI, and JIG, from pre-test to post-test. Means for Supervision and People increased significantly, and the increases were significantly greater than for the other facets or JIG.

We had further evidence. Because only 2/3 of the employees had been reached, we could compare these participants with the non-participants. Participants averaged significantly higher for Supervision satisfaction. But for the other satisfaction scales, including JIG, treatment effects were significantly smaller, sometimes negative, and not significantly different from zero. Even though employees had not been randomly assigned to treatments, the differences seem to support the specific-global labelling of the continuum. Global measures are not, then, equivalent to facet measures, and probably are less sensitive to specific treatments, at least in the short term.

Generality of Findings

We wanted to establish some generality of the results. The patterns of correlation were essentially replicated for the pretest and for another, later, post-test. There are other supporting examples in the job satisfaction literature.

Moreover, the difference between specific and global scales seems to hold in another related content area. Bonnie Sandman and I, with others, have constructed a Job Stress Index. One part scores a number of specific stressors. Another evaluates general feelings of stress. Both parts correlate more closely with each other than with the JDI and JIG, indicating a discriminably different content area. But across areas, the general stress scale correlates more highly with JIG than with JDI, and the specific stressors less with both.

Conclusions and Guidelines

The combination of these lines of evidence supports, I believe, my points that useful measures can be constructed, which vary in generality, in the areas of job satisfaction and job stress. Within each area, there is enough common variance so that any of the measures would have detected a strong relationship at least with a sufficiently large sample.

But they are not equivalent. Each type has its uses. The specific scales predicted relevant tests. Moreover, changes in the situation and in treatment affected the appropriate specific scales. So, if I may be forgiven a trite military analogy, USE A RIFLE TO HIT THE CENTER OF A TARGET.

The global scales, on the other hand, predicted the general tests. We do need them to predict general measures. But they did not respond quickly to a specific treatment. USE A CANNON TO BLAST A LARGE AREA.

The heterogeneous summated scale did not perform well here. High scores on one facet may be masking low scores on another. FIVE SHOTS FROM A RIFLE DO BETTER THAN FIVE PELLETS FROM A SHOTGUN SHELL. These scales might well predict better in other situations and with more heterogeneous dependent variables. Therefore, USE A RIFLE FOR SMALL TARGETS, A CANNON FOR BIG ONES, AND A SHOTGUN IF YOU CAN'T AIM VERY WELL. After all, it gives you a spread of shot.

How can we apply these broad generalities to any particular problem?

(a) STOP--or at least PAUSE. Don't grab the nearest weapon. Don't choose a measure because it is available, popular, cheap, or even because it is reliable or has been shown to have some sort of validity in some situation.

Then (b) READ.

Read the items in the test you are considering using. Do they contain extraneous material? Do they show undesirable overlap with other measures? Do they cover all the areas you want? Are they as general or specific as you want?

Read the research literature. What have your tests actually predicted? Skip the meta-analyses of classes of measures; look at your particular test, and

(c) THINK.

Can you predict how your test will correlate with others? Can you detect a meaningful pattern in studies using it? Then, and only then,

(d) CHOOSE.

Pick a multi-item scale if you need to know its reliability. (How else will you handle non-significant findings?)

Match the verbal level of your scales to that of your intended sample. (Don't make it too difficult, nor talk down to your sample).

Select facet scales if you want to diagnose or detect specific effects of interventions. Break the facets down as finely as necessary for your study.

Pick a general scale to evaluate global feelings or to predict summary feelings or behavior such as life satisfaction, quitting the job, or adjusting to stress.

When you can do so, use both facet and global scales, in that order. BOTH ARE USEFUL.

(e) PLAN FOR THE LONG TERM. For example, JIG might respond to treatments after a longer period of time. And expected overall job satisfaction may be a strong predictor of later perceptions of job characteristics. Single administrations cannot detect such relationships. And, please

(f) GIVE FEEDBACK. The investigators who constructed your tests need information to improve them. Please give them knowledge of results.

We are continuing research on job satisfaction. Projects vary widely. We are computing norms for JIG and the revised JDI. We are comparing costs and decisions made using latent trait and traditional methods of item selection. A major project involves analyzing group differences in ways people combine facet satisfactions, and the effectiveness of non-linear models. We are also trying to clarify the relationships of job stresses to job satisfactions and behavior. And so forth.

We are always watching for opportunities for tracking of the long-term effects of interventions and of changing economic, organizations and social conditions. Repeated measures do furnish a powerful tool for quality control of procedures affecting people. And we practice what we preach -- we are including in our research both specific and global measures. We believe we have answered the question of the talk -- We do need global measures.

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Table 1

Intercorrelations of Satisfaction Measures

(Nuclear Power Facility, N = 600)

	Work	Pay	Super.	Prom.	Peop.	JDI	Uni	JIG
Work	-							
Pay	.24	-						
Supervision	.42	.23	-					
Promotions	.38	.38	.37	-				
People	.38	.18	.37	.25	-			
Summed JDI	.59	.50	.76	.62	.71	-		
Unidimensional	.68	.44	.74	.60	.71	.96	-	
Job in General	.78	.26	.45	.40	.47	.72	.66	-
No. of items	18	9	18	9	18	72	72	18

Table 2

Differential Prediction: Comparison of Types of Scale

	Facet		Unidimen.		Job in Gen.	
	r	IR	r	IR	r	IR
Intent to Leave					X**	**
Life Satisfaction		**			X	**
Trust in Management		**			X	**
Trust in Employees	X**	**		*		
Ident. W/Wk. Org.		*		**	X**	**
Accept. Job Changes		**			X**	**
JCI: Variety		*			X**	**
Autonomy					X	**
Feedback	X**	**				*
Task Identity		**			X**	**
Goal Set: Clarity	X**	**				**
Subord. Freedom	X**	**				
Feedback	X**	**				**
Participation	X**	**				**
Job Definition		**			X	**
Recognition	X**	**				
Merit System Needed	X	**				
Communication		*	X			
Proportion greatest	8/18		1/18		9/18	
(Significant)	7/18	16/18	0/18	2/18	5/18	13/18

(a) r = largest bivariate correlation

IR = Significant incremental multiple correlation when R_6 is subtracted from R_7

* p < .05

** p < .01